

KDD CUP 2020 Winners

On August 27, 2020, 14 individuals from the NTT DOCOMO Group became 3rd, 4th, and 7th place winners in three different sections of KDD CUP 2020, an international data analysis competition. These were Keiichi Ochiai and Hiroaki Tanaka of Research Laboratories, Norihiro Katsumaru, Katsuaki Kawashima, Akihiro Kawana, Daisuke Koizumi^{†1}, Toshiki Sakai, Takuya Chida^{†2}, Tsukasa Demizu, Yusuke Fukushima, Keita Yokoyama, Ryoki Wakamoto, and Masato Hashimoto of Service Innovation Department, and Hiroyuki Suzuki of DOCOMO Technology, Inc.

The KDD CUP is a data analysis competition held at the Knowledge Discovery and Data Mining (KDD) international conference sponsored by the Association for Computing Machinery (ACM) in the United States. It is the world's foremost and longest-running data analysis competition that was first held in 1997 in an era absent of concepts like "big data" and "data scientists."

This is a world conference that uses publically released big data to hold various types of competitions in the accuracy of data analysis. KDD CUP 2020 was divided into six sections drawing the participation of corporations, groups, individuals, and more than 4,000 teams from around the world. The following summarizes the awards given to the above individuals.

- 3rd place in Reinforcement Learning Competition: Development of AI for Repositioning of Taxis in Mobility-on-Demand (Tsukasa Demizu, Norihiro Katsumaru, Hiroyuki Suzuki)

This section is a competition in maximizing the income efficiency of each driver by using reinforcement learning to reposition idle vehicles by AI. The 3rd-place winning team of Demizu et al. developed AI that self-learns income trends by time and area

through reinforcement learning based on prior research and proposes a dispatching pattern for maximizing income. The team was successful in performing high-accuracy and stable dispatching control by constructing a vehicle-operation simulator from provided data on past dispatching results and travel records and in having AI learn from that data with good efficiency.

- 4th place in Machine Learning Competition: Development of AI for Attacking with False Data and Defending (Keiichi Ochiai, Hiroaki Tanaka, Akihiro Kawana, Takuya Chida, Keita Yokoyama, Daisuke Koizumi)

This section deals with AI that classifies the relationships among objects as in an academic-paper citation network. It is a competition in developing two AI techniques: an attacker that mixes in false data to make AI perform erroneous classifications and a defender that correctly classifies objects even after being attacked with false data.

The Ochiai team developed an attack that applies a technique mainly used in image recognition that causes erroneous recognition by making only a slight change to data. It also developed a defense that uses a neural-network technique developed for using data in a network of relationships among objects. The team was successful in maintaining a high-degree of classification accuracy by adapting these techniques to 600,000 data objects provided by the sponsor.

- 7th place in Machine Learning Competition: Development of AI for Retrieving Products of Interest to the User in Product Searches on

E-commerce Websites (Toshiki Sakai, Ryoki Wakamoto, Yusuke Fukushima, Katsuaki Kawashima, Masato Hashimoto)

This section is a competition in developing a technique for retrieving images of products to be clicked on by a user based on text input by the user in a product search on an e-commerce website.

The team improved a deep learning technique called Bidirectional Encoder Representations from Transformers (BERT) widely used in language processing such as translation and developed AI for linking objects included in images with words in the search string. Additionally, by using information on words that express types of objects included in images, the team developed AI that learns correspondences between search strings and images. Using these AI algorithms, the team was successful in identifying images of products to be clicked on with high accuracy.

NTT DOCOMO has been participating in the KDD Cup continuously since 2016. This year marks two consecutive wins following its 1st place win in 2019 and the third time it has been a winner at this competition. NTT DOCOMO employs many data scientists, and amid regular collaborations with business partners, we aim to solve a variety of issues by making effective use of AI and big data. These activities can be linked to this year's winning performance at the KDD Cup.

NTT DOCOMO intends to make full use of the world-class AI and big-data-analysis technologies recognized by the KDD Cup to expand business projects using AI and big data and promote initiatives for solving key social problems.

-
- † 1 Currently on temporary assignment to DOCOMO Technology, Inc.
† 2 Currently on temporary assignment to NTT Security Japan

All company names or names of products, software, and services appearing in this journal are trademarks or registered trademarks of their respective owners.